

Inventoried Buildings in the San Simeon Earthquake

Fred Turner

Staff Structural Engineer

California Seismic Safety Commission

1755 Creekside Oaks Drive, Suite 100

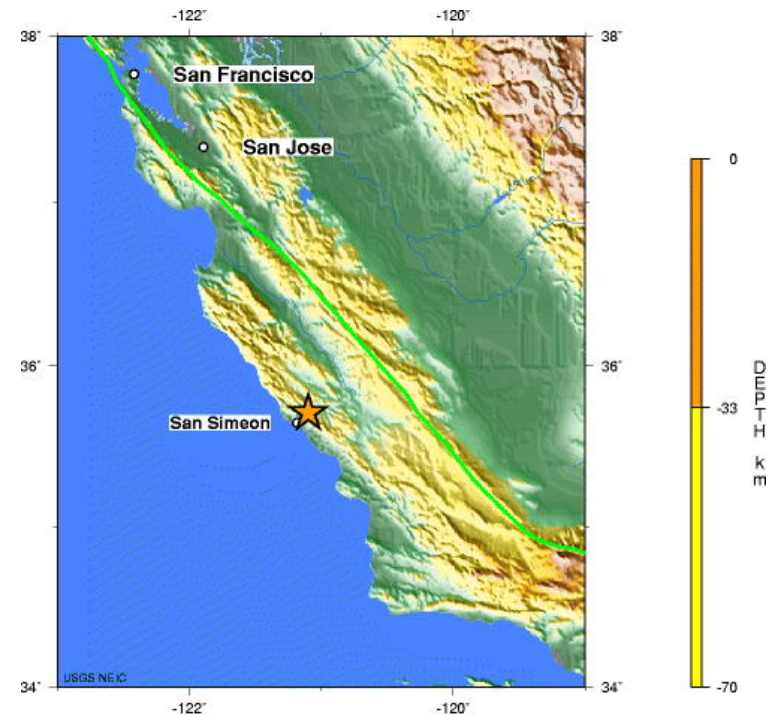
Sacramento, California 95833

e-mail: Turner@StateSeismic.com



Background and Introduction

- At 11:15 am PDT a moment magnitude 6.5 earthquake occurred approximately 7 miles northeast of San Simeon, California
- Suspected fault is the Oceanic fault, but conformation is not yet available.



CENTRAL CALIFORNIA

2003 12 22 19:15:56 UTC 35.71N 121.10W Depth: 7.6 km, Magnitude: 6.5

Earthquake Location

Major Tectonic Boundaries: Subduction Zones -purple, Ridges -red and Transform Faults -green

USGS National Earthquake Information Center



Faults in the Central Coast Region

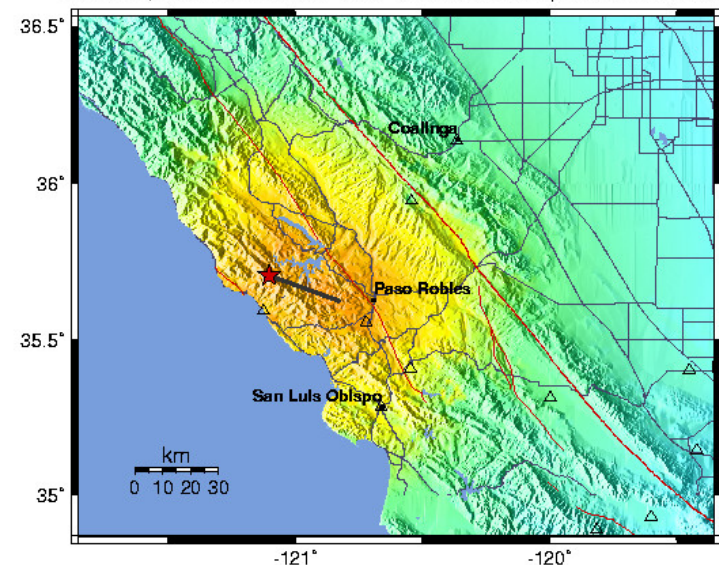


•Image source: USGS

Shake Map for the San Simeon Earthquake

- **Initial Shake Map product was helpful in identifying the extent of the region effected.**
- **ShakeMap initially did not reflect apparent directivity, however a later version was adjusted and did reflect directivity of shaking intensity.**
- **Good event to assess shake map output against observed field conditions.**
 - **Shake may or may not have accommodated data points**
 - **Data point assessment from reviewed records may need to be assessed by SHAKE Map development team**

CISN Rapid Instrumental Intensity Map Epicenter: 11 km NE of San Simeon, CA
Mon Dec 22, 2003 11:15:56 AM PST M 6.5 N35.71 W121.10 Depth: 7.6km ID:40148755



PROCESSED: Tue Jan 6, 2004 04:59:22 PM PST.

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK AOC (%g)	< .17	.17-.19	1.4-3.9	3.9-9.2	9.2-18	18-34	34-66	66-124	>124
PEAK VEL (cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



Effects on People and the Built Environment

- Populations Impacted: County of San Luis Obispo 267,000
 - Paso Robles 26,000
 - Atascadero 26,000
 - Guadalupe in Santa Barbara County 10,000 +/-
 - Other locales
- Casualties – 2 Deaths, 47 Serious Injuries
- Mutual Aid – from Ventura, Santa Barbara, Fresno Counties
- Care and Shelter – Peaked with 3 shelters with up to 20 homeless
- Damaged Buildings – 290 Homes, 191 Commercial Structures
- Public (Government) Damage - \$55 million estimated as of 1-7-04
- Overall Direct Losses - \$250 million +
- Local and State Disasters Declared, Federal Disaster Requested



Damage to Buildings and Contents

- Prevalent Types with Damage
 - Unreinforced Masonry Buildings
 - Wood Frame Dwellings
 - Construction of Mixed Materials
- Built before Codes Required Earthquake Resistance
- Poor Quality in Design and Construction
- Unbraced, Stacked Contents such as Wine Barrels
- Nonstructural Damage (Ceilings, Partitions, Windows...)

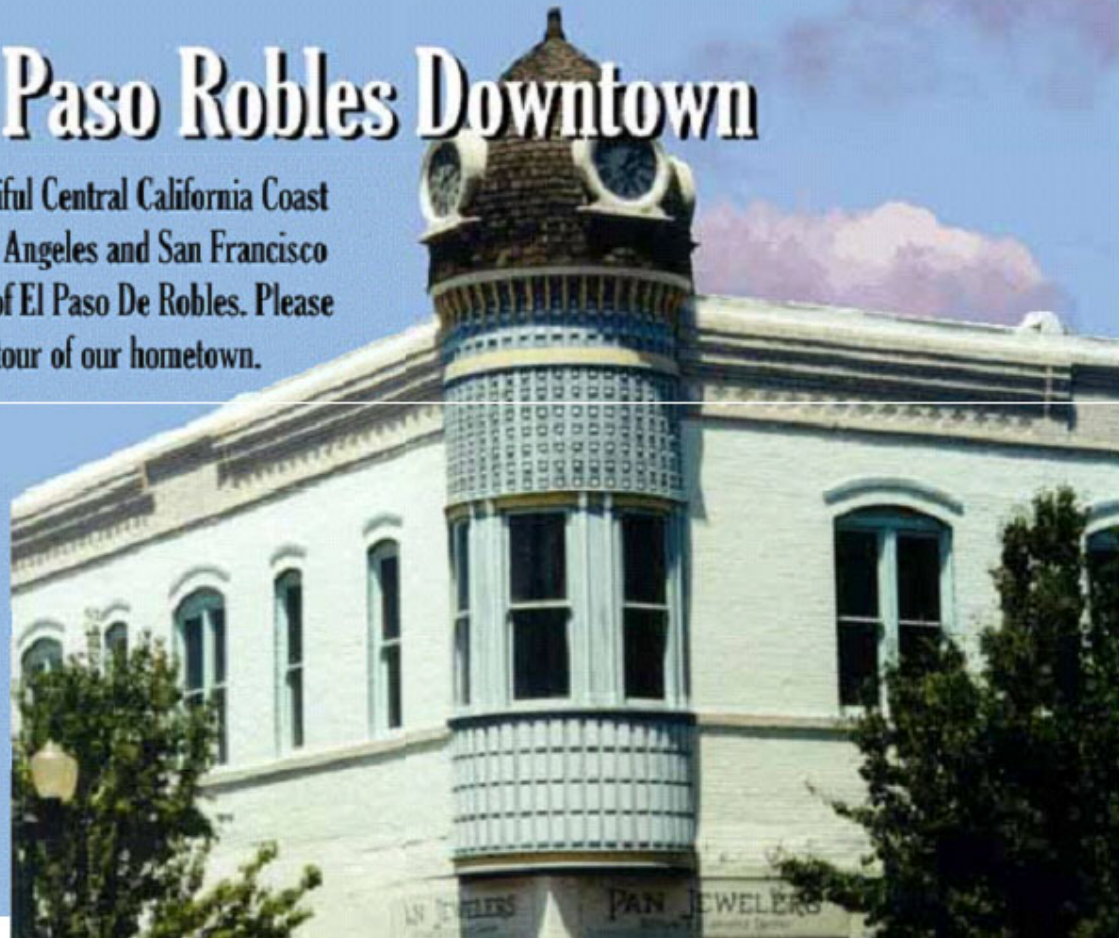


Acorn (Mastagni) Building in Paso Robles

Paso Robles Downtown

Located on the beautiful Central California Coast halfway between Los Angeles and San Francisco lies the historic city of El Paso De Robles. Please join us for an online tour of our hometown.

Past
Present
Future



Acorn Building – Built in 1892



•Photo source: P.R. Main Street Program

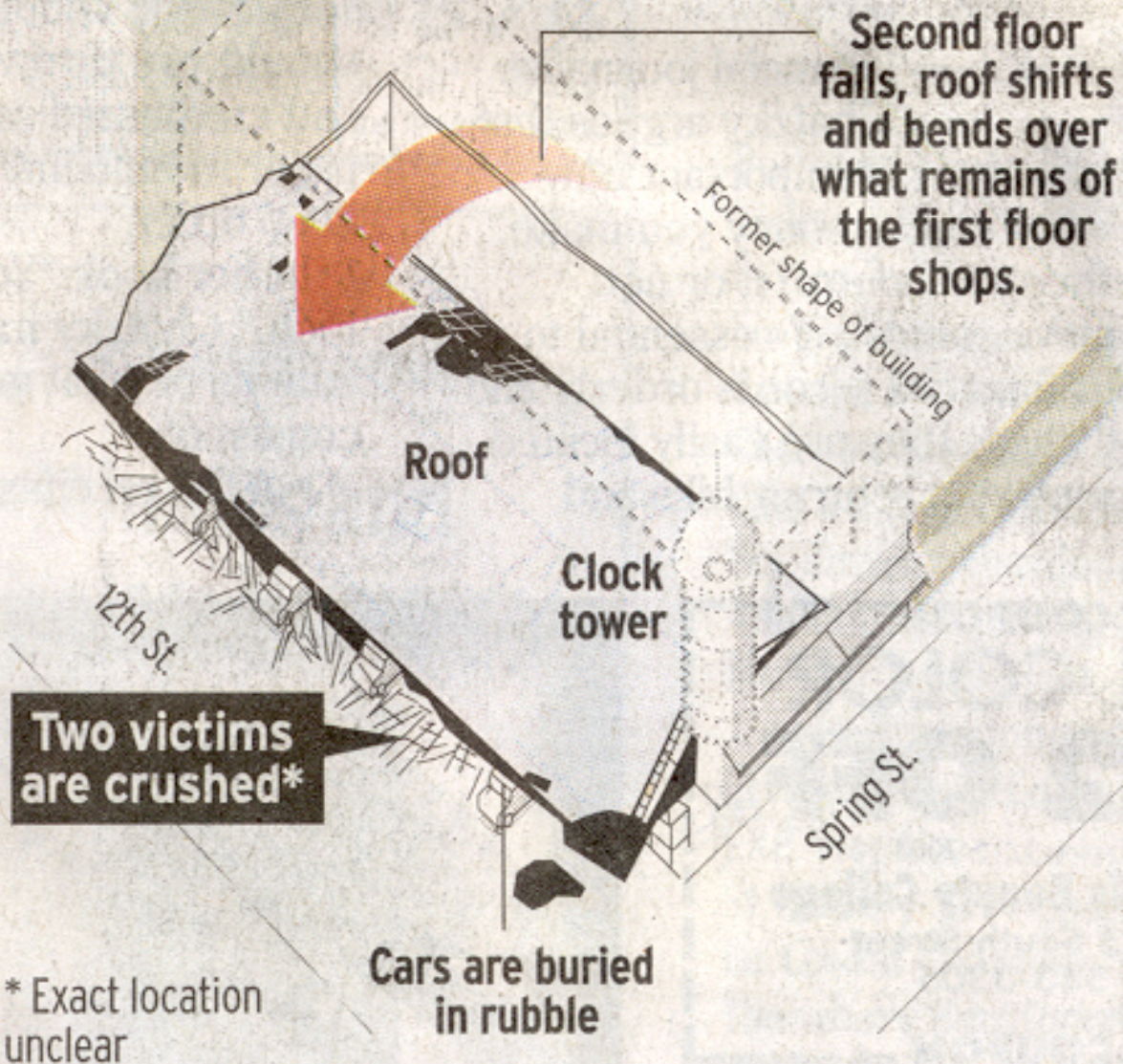
Acorn Bldg - Before & After Paint and Awnings



•Photo source: P.R. Main Street Program



How the Acorn building fell



Collapse of Acorn Building



•Photo source: Joshua Marrow

Aerial View of Acorn Building Collapse, Searches



•Photo source: CNN/ABC Online

Retrofitted Buildings - How they Performed

Bistro Laurent Building – Paso Robles



•Photo source: Joshua Marrow

Bistro Laurent Building, A Retrofitted URM



•Photo source: Rakesh Goel

Bistro Laurent Building – A Retrofitted URM

•Photo source: Rakesh Goel



Partially Retrofitted Atascadero City Hall – 1918 Concrete Frame Building with Brick Facade



Atascadero City Hall Parapet Retrofit



•Photo source: Rakesh Goel

Damage to Unretrofitted Portion of A. City Hall

•Photo source: Sam Vigil



Flamson Public Middle School

1959 Retrofit of a Pre-Field Act URM Building



•Photo source: James McCarthy - DSA

